

Provenance Propagation Methodology of Perth Bushland Species from Seed

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Summary

The Western Australian region near Perth is a unique bushland. There are numerous rare plant species in the area that deserve conservation. Seed viability is impacted by collection techniques. Development of germi-

nation strategies for these must be developed to complement conservation programs. This paper provides examples of this work over the past 20 years at Natural Area Nursery.

INTRODUCTION

The Natural Area native plant nursery is accredited by the Nursery & Garden Industry Australia (NGIA) with a reputation as the

pre-eminent producer of plants for restoration, revegetation and landscape for Perth and WA regions. At our Perth native nursery we tailor plant stock to individual

customer and project needs and welcome the most challenging of propagation by species, provenance and size. Natural Area's capability to combine seed and propagule collection and plant supply in-house is unsurpassed in the market. Our in-house botanical capability compliments our propagation abilities to produce difficult and recalcitrant species. The nursery has twice been awarded 'Best Small Production Nursery' by the Nursery and Garden Industry Australia and has been a finalist in the Western Australia Water Awards for the water retrieval and recycling systems in use.

How Do We Perceive Provenance?

The customers of Natural Area nursery, including our own internal projects, generally require stock of seed and plants to be specific as to provenance. The customer definition of provenance is not consistent. It varies from descriptions such as "Perth region", or within 50 km of the city and down to individual Local Government Areas and in some cases, bush reserve by bush reserve only - a few KM apart. Therefore, we have adopted a policy of all collections and propagation being recorded by individual locations.

We collect from a very high number of locations and therefore when customers seek stock relative to their provenance requirement, we can very often meet that need or action our collectors to do so. Having a good-sized licensed seed collection team places us well to maintain good stocks and get what is needed when we need it. It also means that we come across the opportunist collections and the unexpected and unusual seed set that enhances our propagation.

Our experience over the last 20 plus years has taught us that viability of seed can vary

significantly based upon location. We have developed a very substantial database of seed propagation outcomes based upon collection sites, timing of collection, seed processing techniques and actions to achieve germination. We do not delve into the true science of viability variance as we are focused on the propagation outcome. If we know where to find viable *Gahnia*, *Machaerina*, *Conospermum* & *Lepidosperma* etc. that is all we want to know. It is quite surprising that seed from locations a few kilometers apart have very different outcomes. It is telling also that development and fragmentation of bushland has meant presentation of some species is restricted to a handful of locations. There are species that we have only been able to find two locations that present across 100 km of the Perth plain, and we do a lot of searching. Some are now poorly represented.

The importance of provenance specification to managers and restorers of Perth's unique bushland is important also because of the proven genetic variances that exist. Some of the DNA evidence suggests that similar species have evolved in complete isolation to each other and that variations across genus and species are common for bushland areas that are a short distance apart.

Seed Germination Strategies

The development of germination techniques has been a major focus for our propagators, many of which have been with us for over 10 years. The propagators have been obsessed with testing and recording best seed source, collection timings and germination triggers. They have been encouraged to research the literature, experiment, and use radical treatments if necessary to achieve the desired outcomes. With

so many species in demand for quality restoration work in our market, there is huge potential to further develop our intellectual property in propagation. I am happy to provide with more information of our various methodologies upon request, but a few examples;

- The seasons. Some like autumn, some winter, some spring i.e., don't sow everything in one season
- Extensive variations in use of smoked water, i.e., concentrations and duration timings
- Physical smoke, various source material, repetitions and timings
- Temperature control
- Heating and cooling cycles
- Deprivation of light
- Various acid treatments
- Hydrogen peroxide, again various concentrations / timings.
- Weathering and second seasons resowing.

Weathering and second season germination including details on the role of mycorrhiza in propagation and the role of seed germination from 'difficult species' in conservation are outlined in our recent publication (Hancock, 2023). Second season germination recently yielded over 800 plants for us in one species alone. A major success factor can be a combination of various treatments. All this makes for fascinating, challenging and rewarding work and it's a celebration when success is achieved, and we are driven to pursue the other species on our target list.

A Snapshot of Success

To answer the obvious question, "cut the talk and show me the plants", I have put together a suite of photos of species that not so many years ago, I thought we could never grow, or if so, in any reasonable numbers. There are many others we could cite but the proof is in the demand from our customers, now at 1.2 million and growing, spread over around 350 species.

Myoporum insulare (Scrophulariaceae) has many common names such as Boobialla, Water Bush, Native Mangrove and Blueberry Tree and is distributed along the coastal areas from Shark Bay in Western Australia to north-eastern New South Wales and coastal Tasmania. It is an excellent windbreak in coastal areas growing to 1 – 6 m in height (**Fig. 1a**).

Aotus grassilima (Fabaceae) is native to Western Australia and occurs in swampy areas on the coastal plain from Gingin south to Manjimup. The yellow and red flowers are produced in October and November (**Fig. 1b**).

Alyxia buxifolia (Apocynaceae) commonly known as sea bush or dysentery bush is a spreading, woody native shrub growing to 2 m height with thick, glossy green leaves (**Fig. 1c**). Waxy white flowers appear in Spring, followed by red berries. It is ideal for Coastal positions, also tolerant of shade, growing in Eucalypt forests. It is useful as a screening plant and is mass planted in garden beds. It is widely adapted to different soil types and from dry to wetland areas. Use of the bark by first nation people of Australia for treatment of dysentery gave this plant the name dysentery bush. It is an ideal refuge for many insects, lizards and native birds.

Acanthocarpus preissii (Asparagaceae) is a rhizomatous perennial occurring on coastal dunes in Western Australia (Fig. 1d). Commonly known as prickly lily, its white flowers appear between April and

May, hosting some rare butterflies including silver-spotted ochre (*Trapezites argenteornatus*).

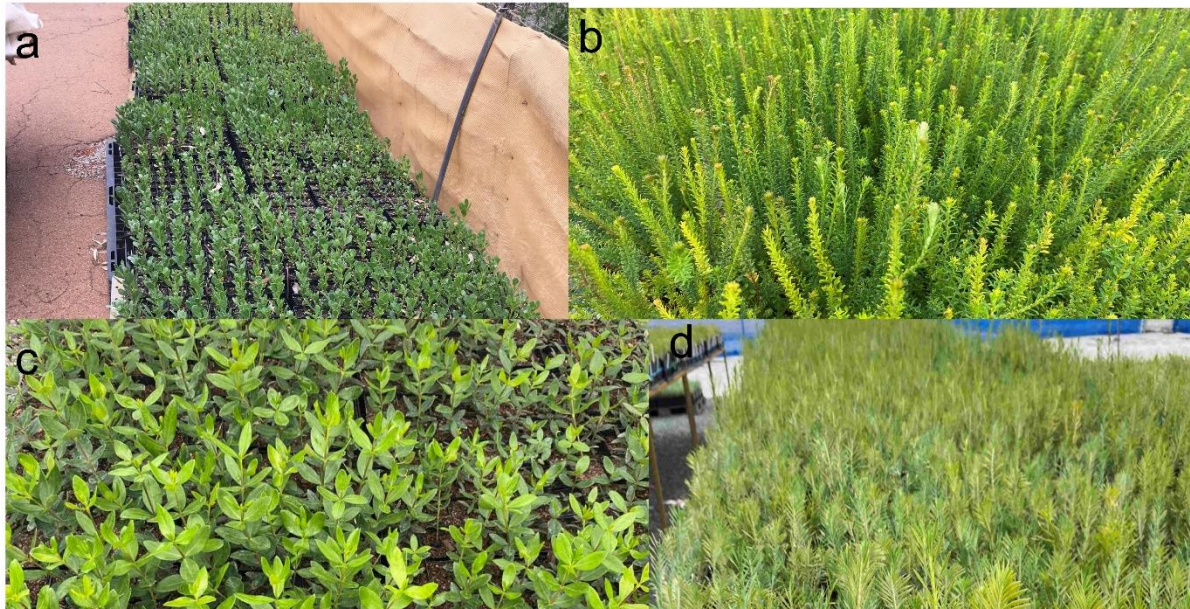


Figure 1. Some of the diverse species grown from seeds at the Natural Area Nursery: (a) *Myoporum insulare* (Scrophulariaceae), (b) *Aotus grassilima* (Fabaceae), (c) *Alyxia buxifolia* (Apocynaceae) and (d) *Acanthocarpus preissii* (Asparagaceae).



Figure 2. Some of the diverse species grown from seeds at the Natural Area Nursery: (a) *Adansonia gregorii*, (b) *Brachyloma preissii*, (c) *Calytrix fraserii* and (d) *Conospermum triplinervium*.

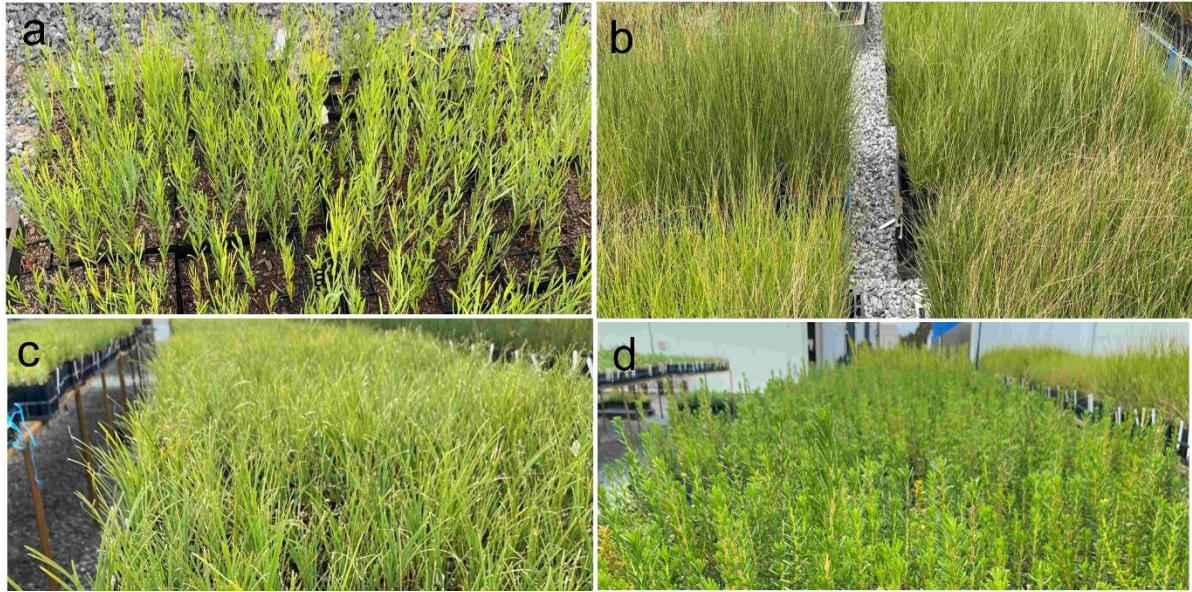


Figure 3. Some of the species growing at the Natural Area Nursery, among approximately 350 spp., raised from seeds and ready for planting: (a) *Exocarpus spartius*, (b) *Gahnia trifida*, (c) *Lomandra maritima* and (d) *Hibbertia hypericoides*.



Figure 4. Species from diverse families such as Zamiaceae (*Macrozamia fraserii* & *M. reidlieii*) (a), Loranthaceae (*Nuytsia floribunda*) (b), Myrtaceae (*Scholtsia involcrata*) (c), Goodeniaceae (*Scaevola crassifolia*) (d) etc. are represented in the diverse spectrum of native plants, particularly adapted to Western Australia, propagated and sold by Natural Area Nursery.

Acknowledgement

Thanks and congratulations to the team at Natural Area Nursery for their dedication and successes.

LITERATURE CITED

Hancock, David (2023) Achieving success with difficult species. The Propagator, International Plant Propagators' Society, Australian Region Newsletter 74:2-4.